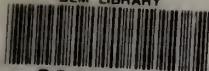


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UTILIZATION OF CALIFORNIA DESERT HABITAT TYPES
OF BIRDS IN SECTION 9 AND 10 OF LANFAIR VALLEY, CALIFORNIA

1978

by

Barbara A. Carlson
P.O. Box 1015
Upland, California 91786

for

Bureau of Land Management
1695 Spruce Street
Riverside, California 92507

Contract CA-060-CT8-57

JOSHUA TREE WOODLAND - 10 - -- Location: California, San Bernardino Co., Lanfair Valley, 5.3 mi N of Cedar Cyn Rd., 4.0 mi E of Ivanpah Rd. The plot is in the E 1/2 of the NW 1/4 and W 1/2 of the NE 1/4 of Sec. 10, T13N, R17E, Lanfair Valley Quadrangle, USGS; $35^{\circ} 14'N$, $115^{\circ} 8'W$. The NW corner is approximately 75m S and 110 m W of the USGS Sec. 3/Sec. 10 1/4 marker. Continuity: New. Size: 20 ha = 49.42 acres, (rectangular 500m x 400m, measured). Description of Plot: Typical Joshua Tree Woodland that is found in the northern portion of the valley. Vegetation: Five (5) 100 toe-point transects were made to determine percent cover and species composition. The substrata consisted of 48.6% bare ground, 36.0% litter, 9.2% small rocks (<5 cm), 4.2% shrub stems, and 2.0% large rocks (>5 cm). Small and large shrubs and perennial grasses formed a canopy cover and ground cover of 16.8%. Composition of perennial plants included 29.0% Galleta Grass (Hilaria rigida), 15.2% Little-Leaved Ratany (Krameria parvifolia), 9.2% Creosote Bush (Larrea tridentata), 7.6% Goldenhead (Acamptopappus sphaerocephalus), 7.2% Cheese Bush (Hymenoclea salsola), 5.2% Black-banded Rabbit Brush (Chrysothamnus paniculatus), 4.8% Hop-Sage (Grayia spinosa), 3.0% Mormon Tea (Ephedra nevadensis), 2.8% Cooper Goldenbush (Haplopappus cooperi), 2.4% Woolly-fruited Burbush (Ambrosia ericentra), 2.0% Wild-Rhubarb (Rumex hymenosepalus), 1.8% Burro-weed (Ambrosia dumosa), 1.6% Ricegrass (Oryzopsis hymenoides), 1.0% each of Desert Mallow (Sphaeralcea ambigua), and Buckhorn Cholla (Opuntia acanthocarpa), 0.8% each of Bladder-sage (Salazaria mexicana), and Winter Fat (Eurotia lanata), 0.6% each of Cooper's Foxthorn (Lycium cooperi), Mojave Yucca (Yucca schidigera), and Purple Sage (Salvia dorrii), 0.4% each of Grizzly Bear Cactus (Opuntia erinacea, var. ursina), and Joshua Tree (Yucca brevifolia), 0.2% each of

Matchweed (Gutierrezia microcephala), California Buckwheat (Eriogonum fasciculatum), Four-O'Clock (Mirabilis froebelii), Desert-Aster (Machaeranthera tortifolia), Paper Flower (Psilos trophe cooperi), Desert Almond (Prunus fasciculata), Spanish Bayonet (Yucca baccata), Cotton Thorn (Tetradymia axillaris), Desert Trumpet (Eriogonum inflatum), and Jimsonweed (Datura meteloides). Plant names are from Philip A. Munz, A Flora of Southern California, 1974. The area has a long history of livestock grazing, which probably has affected the composition of the understory. It has not been grazed this year. Elevation: 4100 ft (1250m).

Edge: The plot is bounded on all sides by Joshua Tree Woodland community. There is a dirt road 75m-100m south of the plot frequently used by local ranchers. Topography: Basically flat with one wide, but shallow wash extending from the NW to the SE in the southern half of the plot.

Water: The nearest permanent water is a livestock water tank located approximately 150m S of the SW corner. Weather: Temperatures during the study period ranged from 57°F to 91°F with no precipitation recorded.

Coverage: June 10, 14, 21, 23, 24, 26, 28, 30. Total: 8 trips, all between 0445 and 1000 PST. Total Man-hours: 29.0. Census: Mourning Dove, 8 (40,16); Black-throated Sparrow, 4.5 (23,9); Ash-throated Flycatcher, 2.5 (13,5); Verdin, 2 (10,4); Cactus Wren, 2; Gambel's Quail, 1.5 (8,3); Mockingbird, 1.5; Loggerhead Shrike, 1.5; Bendire's Thrasher, 1 (5,2); LeConte's Thrasher, 1; Black-tailed Gnatcatcher, 1; House Finch, 1; Brewer's Sparrow, 1; Common Flicker-Gilded Race, .5; Red-tailed Hawk, +; American Kestrel, +; Ladder-backed Woodpecker, +; Western Kingbird, +; Brown-headed Cowbird, +. Total: 19 species; 29 territorial males or females ($145/\text{km}^2$, 59/100 acres). Visitors: Turkey Vulture, Swainson's Hawk, Golden Eagle, Lesser Nighthawk, Say's Phoebe, Horned Lark, Cliff Swallow, Lark Bunting. Late Migrant: Western Wood PeeWee.

Remarks: 3 active nests were found; 1 each of Ash-throated Flycatcher, Cactus Wren and House Finch. A Hawk nest believed to be the Red-tailed Hawk's nest used this year was also found. The following were observed feeding fledglings just out of the nest; Ladder-backed Woodpecker, Western Kingbird, Ash-throated Flycatcher, Verdin, Black-tailed Gnatcatcher (feeding fledgling Brown-headed Cowbird), Black-throated Sparrow, Brewer's Sparrow. Two evenings were spent listening and watching for owls and goatsuckers. A Lesser Nighthawk was observed on one of the evenings. Poorwills were observed within .5 mi of the plot and probably use the area. The female Common Flicker had yellow shafts and male and juveniles observed had red shafts. The count on the Mourning Dove is average number of pairs observed on the plot and may be incorrect as doves were flying from surrounding area to the water tank near the southwest corner of the plot. The following mammals and reptiles were observed on the plot during the surveys (numbers indicates total number of observations); Black-tailed Jack Rabbit (Lepus californicus), 40; Desert Cottontail (Silvalagus auduboni), 3; White-tailed Antelope Squirrel (Ammospermophilus leucurus), 16; Desert Woodrat (Neotoma lepida), 1; Western Whiptail Lizard (Cnemidophorus tigris), 33; Zebra-tailed Lizard (Callisaurus draconoides), 14; Desert Spiny Lizard (Sceloporus magister), 8; Leopard Lizard (Crotaphytus wislizenii), 1; Side-blotched Lizard (Uta stansburiana), 3. We wish to thank Ruth C. Yoder and Rolland H. Wissler for assistance given during the survey. This study was sponsored by the Bureau of Land Management, California Desert Plan Program. BARBARA A. CARLSON, P.O. Box 1015, Upland, CA. and SHELDON J. NEWBERGER, 978-A Springfield Ave., Upland, CA.

JOSHUA TREE WOODLAND -- Location: California, San Bernardino Co., Lanfair Valley, 5.3 mi N of Cedar Cyn. Rd., 4.0 mi E of Ivanpah Rd. The plot is in the E 1/2 of the NW 1/4 and W 1/2 of the NE 1/4 of Sec. 10, T13N, R17E, Lanfair Valley Quadrangle, USGS; 35° 14'N, 115° 8'W. The NW corner is approximately 75m S and 110 m W of the USGS Sec. 3/Sec 10 1/4 marker. Continuity: See Breeding Bird Survey, 1978.

Size: 20 ha = 49.42 acres, (rectangular 500m x 400m, measured).

Description of Plot: Typical Joshua Tree Woodland that is found in the northern portion of the valley. Weather: Temperatures during the study period ranged from 54° to 98° F. Very little precipitation was recorded as the normal summer rains were light and sporadic in ground coverage. Coverage: Jul 20, 22, Aug 4, 6, Sep 9, 10. Total: 6 trips, all between 0450 and 0900 PST, averaging 183 minutes each.

Count: Pinon Jay, 59 (295, 119); Mourning Dove, 38 (190, 77); Gambel's Quail, 17 (85, 34); House Finch, 17; Black-throated Sparrow, 13 (65, 26); Cactus Wren, 6 (30, 12); Ladder-backed Woodpecker, 2 (10, 4); Loggerhead Shrike, 2; Brewer's Sparrow, 2; American Kestrel, 1 (5, 20); Common 'Gilded' Flicker, 1; Barn Swallow, 1; Verdin, 1; LeConte's Thrasher, 1; Cooper's Hawk, +; Marsh Hawk, +; Red-tailed Hawk, +; Poorwill, +; Roadrunner, +; Ash-throated Flycatcher, +; Western Kingbird, +; Tree Swallow, +; Horned Lark, +; Bendire's Thrasher, +; Black-tailed Gnatcatcher, +; Brown-headed Cowbird, +; Scott's Oriole, +; Lark Sparrow, +. Total 28 species, 161 ($805/\text{km}^2$, 326/100 acres).

Remarks: Ash-throated Flycatcher, Western Kingbird, Bendire's Thrasher, Black-tailed Gnatcatcher, Brown-headed Cowbird and Scott's Oriole are breeding/summer residents who migrated out sometime during the census period and therefore the numbers reflected are lower than normal.

Pinon Jays observed are probably flock invasions that occur in fall and winter from surrounding mountains. The Barn Swallow and Tree Swallow are fall migrants. The Cooper's Hawk, Marsh Hawk, and Lark Sparrow are either fall migrants or wintering residents that arrived during the census period. The plot continues to have more species and individuals than the plot in Sec. 9. There has been some grazing since June but not much. The watering tank to the SW of the plot is probably the attractant force for the Gambel's Quail, Mourning Dove, and House Finch as the area becomes dryer. We wish to thank Ruth C. Yoder and Steve Knuttel for assistance given on the surveys. This study was sponsored by the Bureau of Land Management, California Desert Plan Program. BARBARA A. CARLSON, P. O. Box 1015, Upland, CA 91786, and SHELDON J. NEWBERGER, 978-A Springfield Ave., Upland, CA 91786.

JOSHUA TREE WOODLAND -- Location: California, San Bernardino Co., Lanfair Valley, 5.3 mi N of Cedar Cyn Rd., 4.0 mi E of Ivanpah Rd. The plot is in the E 1/2 of the NW 1/4 and W 1/2 of the NE 1/4 of Sec. 10, T13N, R17E, Lanfair Valley Quadrangle, USGS; $35^{\circ}14'N$, $115^{\circ}8'W$. The NW corner is approximately 75m S and 110 m W of the USGS Sec. 3/Sec. 10 1/4 marker. Continuity: See Breeding Bird Survey 1978. Size: 20 ha = 49.42 acres, (rectangular 500m x 400m, measured). Description of Plot: Typical Joshua Tree Woodland that is found in the northern portion of the valley. Weather: Temperatures during the study period ranged from 32° to 84° F. Precipitation of both rain and snow fell during November and December. Coverage: Oct 8, 14, Nov 18, 26, Dec 3, 11, 1978. Total: 6 trips, all between 0600 and 1030, averaging 184 minutes each. Count: House Finch, 26(130, 53); Black-throated Sparrow, 9 (45, 18); Gambel's Quail, 7 (35, 14); Mourning Dove, 5(25, 10); Cactus Wren, 4 (20, 8); Sage Sparrow, 3 (15, 6); Common (Gilded) Flicker, 1 (5, 2); Ladder-backed Woodpecker, 1; Verdin, 1; LeConte's Thrasher, 1; Loggerhead Shrike, 1; Yellow-rumped (Audubon's) Warbler, 1; Golden Eagle, +; Swainson's Hawk, +; Prairie Falcon, +; American Kestrel, +; Roadrunner, +; Great Horned Owl, +; Common Raven, +; Pinyon Jay, +; Blue-gray Gnatcatcher, +. Average total: 60 birds ($300/km^2$, 121/100 acres). Remarks: 21 species. Hunters were present on and near the plot during the 18 Nov census, unfortunate but unavoidable. I believe the hunting not only had an effect on the number of Gambel's Quail present thereafter, but also on the other passerine species, not necessarily shooting them, but driving them back into areas not hunted, away from the plot itself. I thank Ruth C. Yoder for assistance given during the survey. This study was sponsored by the Bureau of Land Management, California Desert Plan Program. BARBARA A. CARLSON, P. O. Box 1015, Upland, CA 91786.

Sec. 1

Methods Used:

Bird Surveys: The surveys were conducted by slowly walking thru the plot at approximately 100 m intervals along the length of the plot (see

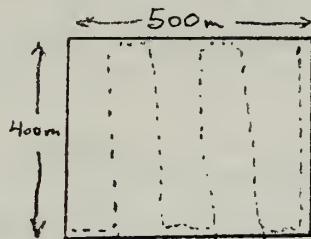


diagram). The only stops made were occasional observations that we thought might lead to nests, etc. When more than one person was along one did the identification and the other the recording.

One point of interest - in order to meet the deadline of the end of June we had to census on consecutive days two times. The second day turned out to be one of the lowest count days each time. It may be a coincidence, but it appears that allowing at least one day between is a better method for recording the maximum number of birds.

Determining territories was difficult - when juveniles are out of the nest the territories tend to break down. The spot-maps were used to determine territories for all species except doves. The actual count of doves is much higher because the plot is in the "flyway" to the water tank. I went back to the maps and attempted to determine those doves that moved from within the plot, then used one-half as the ~~number of~~ territorial pairs. For the maps 3 different days recorded constituted a territory in keeping with the standards from American Birds.

The Flickers, according to Grinnell, Miller & Peterson, with the reddish shafts are probably Gilded Flickers - they have the two forms, rather than being the red-shafted race interbreeding with the gilded race. I have treated them as all gilded race.

Vegetation Analysis: The five 100 toe-point transects were run starting at approximately the 50m, 150m, 250m, 350m and 450m points along the length edge. A toe-point was taken at every 6th pace which was approximately 4m so the lines crossed the plot. One paced and one recorded. We alternated after each 100 toe-point transect in recording and pacing.

However, I believe that belt transects would give a truer picture of the vegetation here because of the large differences between cover of a clump of Hilaria and of the shrubs. Belt transects would probably give a clearer picture of the grazing effects also.

JOSHUA TREE WOODLAND - 9 -- Location: California, San Bernardino Co., Lanfair Valley, (5.4 mi N of Cedar Cyn Rd), 2.8 mi E of Ivanpah Rd. The plot is in the NW 1/4 of Sec. 9, T13N, R17E, Lanfair Valley Quadrangle, USGS; $35^{\circ} 14'N$, $115^{\circ} 8'W$. Continuity: New. Size: 20 ha = 49.42 acres, (rectangular 500m x 400m, measured). Description of Plot: A typical Joshua Tree Woodland community of the northern portion of the valley. Joshua trees are scattered over the plot with a concentration near the middle of the west edge. Vegetation: Five (5) 100 toe-point transects were made to determine percent cover and species composition. The substrata consisted of 40.6% bare ground, 30.4% litter, 14.2% small rocks (<5 cm), 12.2% scrub stems and 2.6% large rocks (≥ 5 cm). Small and large scrubs and perennial grasses formed a canopy cover and ground cover of 21.8%. Composition of perennial plants included 41.0% Galleta Grass (Hilaria rigida), 11.4% Cooper's Goldenbush (Haplopappus cooperi), 9.0% Burro-weed (Ambrosia dumosa), 7.2% Hop-Sage (Gravia spinosa), 5.4% Creosote Bush (Larrea tridentata), 5.0% Matchweed (Gutierrezia microcephala), 3.0% Desert Mallow (Sphaeralcea ambigua), 2.8% Goldenhead (Acamptopappus sphaerocephalus), 2.0% Cheese Bush (Hymenoclea salsola), 1.4% each of Woolly-fruited Burbush (Ambrosia eriocentra), and Hoffmanseggia densiflora, 1.2% each of Winter Fat (Eurotia lanata), Mormon Tea (Ephedra nevadensis), and Little-leaved Ratany (Krameria parvifolia), 1.0% Purple Sage (Salvia dorrii), .8% Ricegrass (Oryzopsis hymenoides), .6% each of Buckhorn Cholla (Opuntia acanthocarpa), and Desert Trumpet (Eriogonum inflatum), .4% each of Four O'Clock (Mirabilis freebelii), Broom Twinberry (Menodora scoparia), Spanish Bayonet (Yucca baccata), Bladder-sage (Salazaria mexicana), Mohave Yucca (Yucca schidigera), Desert Willow (Chilopsis linearis), Wild-Rhubarb (Rumex hymenosepalus), and .2% each of Cooper's

Boxthorn (Lvcium cooperi), Desert Almond (Prunus fasciculata), Desert-Aster (Machaeranthera tortifolia), California Buckwheat (Eriogonum fasciculatum), and Paperflower (Psilostrophe cooperi). Plant names are from Philip A. Munz A Flora of Southern California, 1974. The area has a long history of livestock grazing, which probably has affected the composition of the understory. It has not been grazed this year.

Elevation: 4180 ft (1274m). Edge: The plot is bounded on all sides by Joshua Tree Woodland with a wide but shallow wash near the east side and a dirt road that had not been used for a few years running approximately 25-75m to the south of the plot. Topography: Basically flat with moderately wide but shallow wash running from the NW to the SE across the S half of the plot. Water: The nearest permanent water are livestock watering troughs and tank, one 1.2 mi SW and one 1 mi E of the plot.

Weather: Temperatures during the census ranged from 57°F to 91°F. No precipitation was recorded. Coverage: June 11, 15, 22, 24, 25, 27, 29, 30.

Total: 8 trips, all between 0430 and 0900 PST. Total Man-hours: 27.5.

Census: Mourning Dove, 7 (35,14); Black-throated Sparrow, 5.5 (28,11); Ash-throated Flycatcher, 2 (10,4); Mockingbird, 2; Gambel's Quail, 2; Loggerhead Shrike, 2; Cactus Wren, 1.5 (8,3); LeConte's Thrasher, 1 (5,2); Scott's Oriole, 1; Horned Lark, .5; Bendire's Thrasher, .5; Red-tailed Hawk, +; Common Flicker-Gilded Race, +; Total: 13 species; 25 territorial males or females ($125/\text{km}^2$, 51/100 acres). Visitors: Turkey Vulture,

American Kestrel, Ladder-backed Woodpecker, Say's Phoebe, Common Raven, Verdin, Mountain Bluebird, Western Meadowlark, House Finch, Black-chinned Sparrow, Brewer's Sparrow. Remarks: 8 active nests were found; 5 Mourning Dove, 1 each of Ash-throated Flycatcher, Cactus Wren and Horned Lark. Two evenings were spent listening and watching for owls and goatsuckers without success. However, Poor-wills were observed foraging

less than .5 mi from the plot and probably use the area. The count on the Mourning Doves is the average number of pairs observed on the plot but is probably close to the real number of breeding pairs since 5 active nests were found. A pack of burros went thru the plot during the night of Jun 29. Other mammals and reptiles observed during the census were (numbers indicate total numbers of observations): Black-tailed Jackrabbit (Lepus californicus), 46; Desert Cottontail (Silvalagus auduboni), 20; White-tailed Antelope Squirrel (Ammospermophilus leucurus), 3; Desert Woodrat (Neotoma lepida), 3; Coyote (Canis latrans), 1; Western Whiptail Lizard (Cnemidoporus tigris), 50; Desert Spiny Lizard (Sceloporus magister), 3; Zebra-tailed Lizard (Callisaurus draconoides), 5; Desert Horned Lizard (Phrynosoma platyrhinos), 3; Side-blotched Lizard (Uta stansburiana), 4; and Leopard Lizard (Crotaphytus wislizenii), 3.

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JOSHUA TREE WOODLAND -- Location: California, San Bernardino Co., Lanfair Valley, 5.4 mi N of Cedar Cyn. Rd, 2.8 mi E of Ivanpah Rd. The plot is in the NW 1/4 of Sec. 9, T13N, R17E, Lanfair Valley Quadrangle, USGS; $35^{\circ} 14'N$, $115^{\circ} 8'W$. Continuity: See Breeding Bird Survey, 1978. Size: 20 ha = 49.42 acres, (rectangular 500m x 400m, measured). Description of Plot: A typical Joshua Tree Woodland community of the northern portion of the valley. Weather: Temperatures during the census ranged from 63° to 98° F. Very little precipitation was recorded as the normal summer rains were light and sporadic in coverage. Coverage: Jul 21, 23, Aug 5, 7, Sep 4, 10. Total: 6 trips, all between 0440 and 0845 PST, averaging 198 minutes each. Count: Black-throated Sparrow, 25 (125, 51); Mourning Dove, 18 (90, 36); House Finch, 5 (25, 10); Pinon Jay, 5; Cactus Wren, 4 (20, 8); Gambel's Quail, 3 (15, 6); Ash-throated Flycatcher, 3; Loggerhead Shrike, 3; LeConte's Thrasher, 2 (10, 4); Scott's Oriole, 1 (5, 2); Turkey Vulture, +; Red-tailed Hawk, +; Great Horned Owl, +; Poorwill, +; Common 'Gilded' Flicker, +; Ladder-backed Woodpecker, +; Say's Phoebe, +; Verdin, +; Bewick's Wren, +; Mockingbird, +; Crissal Thrasher, +; Brewer's Sparrow, +. Total 22 species, 69 ($345/\text{km}^2$, 140/100 acres).

Remarks: Ash-throated Flycatcher and Scott's Oriole are breeding/summer residents who migrated out sometime during the census period and therefore the numbers reflected are lower than normal. Pinon Jays observed are probably flock invasions that occur in fall and winter from the surrounding mountains. No true migrants were observed. This plot continues to have fewer species and fewer individuals than the plot in Sec. 10. There has been evidence of increased grazing in this area. We wish to thank Ruth C. Yoder and Steve Knuttel for

assistance given on the surveys. This study was sponsored by the Bureau of Land Management, Desert Plan Program. BARBARA A. CARLSON, P. O. Box 1015, Upland, CA. 91786 and SHELDON J. NEWBERGER, 978-A Springfield Ave., Upland, CA. 91786.

JOSHUA TREE WOODLAND -- Location: California, San Bernardino Co., Lanfair Valley, (5.4 mi N of Cedar Cyn Rd), 2.8 mi E of Ivanpah Rd. The plot is in the NW 1/4 of Sec. 9, T13N, R17E, Lanfair Valley Quadrangle, USGS; $35^{\circ}14'N$, $115^{\circ}8'W$. Continuity: See Breeding Bird Survey 1978. Size: 20 ha = 49.42 acres, (rectangular 500m x 400m, measured). Description of Plot: A typical Joshua Tree Woodland community of the northern portion of the valley. Joshua trees are scattered over the plot with a concentration near the middle of the west edge. Weather: Temperatures during the study period ranged from 32° to 84° F. Precipitation of both rain and snow fell during November and December. Coverage: Oct 8, 15, Nov 19, 26, Dec 3, 11, 1978. Total: 6 trips, all between 0600 and 1030 PST, averaging 183 minutes each. Count: Gambel's Quail, 21(105,42); House Finch, 12(60, 24); Sage Sparrow, 7 (35,14); Black-throated Sparrow, 6(30, 12); Loggerhead Shrike, 2 (10, 4); Red-tailed Hawk, 1(5, 2); Ladder-backed Woodpecker, 1; Verdin, 1; Cactus Wren, 1; Bendire's Thrasher, 1; LeConte's Thrasher, 1; White-crowned Sparrow, 1; Golden Eagle, +; Cooper's Hawk, +; Common Raven, +; Common (Gilded) Flicker, +; Bewick's Wren, +. Average total: 55 birds ($275/\text{km}^2/111/100 \text{ acres}$).

Remarks: 17 species. The Gambel's Quail appeared in a large flock on this plot in the middle of November, probably due to the hunting pressure near the roads and tanks. The Bendire's Thrasher did not migrate out until the middle of November. There were fewer House Finches on this plot compared to the one in Sec. 10. Although no cattle were observed on the plot, there was evidence of grazing on a small scale. I thank Ruth C. Yoder for assistance given during the survey. This study was sponsored by the Bureau of Land Management, California Desert Plan Program. BARBARA A. CARLSON, P. O. Box 1015, Upland, CA 91786.

Methods Used:

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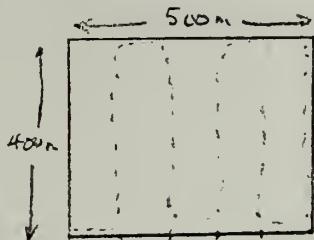


diagram). The only stops made were occasional observations that we thought might lead to nests, etc. When more than one person was along one did the identification and the other the recording.

One point of interest - in order to meet the deadline of the end of June we had to census on consecutive days two times. The second day turned out to be one of the lowest count days each time. It may be a coincidence, but it appears that allowing at least one day between is a better method for recording the maximum number of birds.

Determining territories was difficult - when juveniles are out of the nest the territories tend to break down. The spot-maps were used to determine territories for all species except doves. The doves were calculated by using the average divided by two for number of territorial pairs. Although Verdins and Brewer's Sparrows were seen on at least three occasions each, they were immatures and therefore counted as visitors.

Vegetation Analysis: The five 100 toe-point transects were run starting at approximately the 50m, 150m, 250m, 350m and 450m points along the length edge. A toe-point was taken at every 6th pace which was approximately 4m so the lines crossed the plot. One paced and one recorded. We alternated after each 100 toe-point transect in recording and pacing.

However, I believe that belt transects would give a truer picture of the vegetation here because of the large differences between cover of a clump of Hilaria and of the shrubs. Belt transects would probably give a clearer picture of the grazing effects also.

Form 1279-3
(June 1984)

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